Module 1

Introduction to Piping

Module Overview

Creo Piping enables you to create 3-D piping designs as part of an integrated product development process. Piping designs can be either specification driven or non-specification driven, for example, manually routed. Specification-driven designs involve using piping specifications and automated modeling tasks; this method is used by the Plant, Shipbuilding, and Aerospace industries. Non-specification-driven piping involves creating piping systems using manual tasks, and is often used when designing flexible piping systems. In addition, 2-D schematic design information in the form of Process and Instrumentation Diagrams (created in Creo Schematic) can be used to pass design information into specification-driven piping designs in Creo Parametric. It is important to understand the piping design processes, concepts, and terminology associated with Creo Piping.

Objectives

After completing this module, you will be able to:

- Describe the manual piping design process.
- Describe the specification-driven piping design process.
- Describe Creo Parametric piping concepts and terminology.
- Create manually routed (non-specification-driven) pipelines.
- Create specification-driven pipelines.

Understanding Piping Design Methods

Within Creo Parametric, there are two methods you can use to develop 3-D piping designs: manually routed piping (non-specification-driven piping) and specification-driven piping.

Non-Specification-Driven Piping

- Configure pipeline stock
- Route Pipelines
- Insert Fittings
  - Flexible Piping
  - Tubing

Specification-Driven Piping

- Configure pipeline stock
- Industrial Piping Designs
- Controlled by
  - Piping Specifications
  - Design Rules

Figure 1 – Non-Specification-Driven (Manual) Piping Design Example

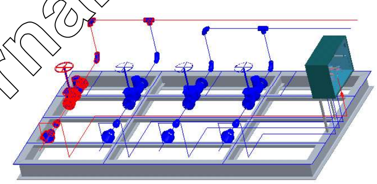


Figure 2 – Specification-Driven Piping Design Example

Understanding Piping Design Methods

Within Creo Parametric, there are two methods you can use to develop 3-D piping designs:

- Manually routed piping (non-specification-driven piping)
- Specification-driven piping

Non-Specification-Driven Piping

This method of piping design enables maximum flexibility and involves configuring pipeline stock and manually routing pipes and inserting fittings.

- It typically applies to flexible piping designs and tubing.

Specification-Driven Piping

Piping design as utilized by designers in the Plant design, Shipbuilding, and Aerospace design industries.

- This method of piping design is driven by a set of piping specifications and design rules.

Manual Piping Development Process

Creating manual piping systems involves configuring pipeline stock, routing pipelines, and inserting fittings.

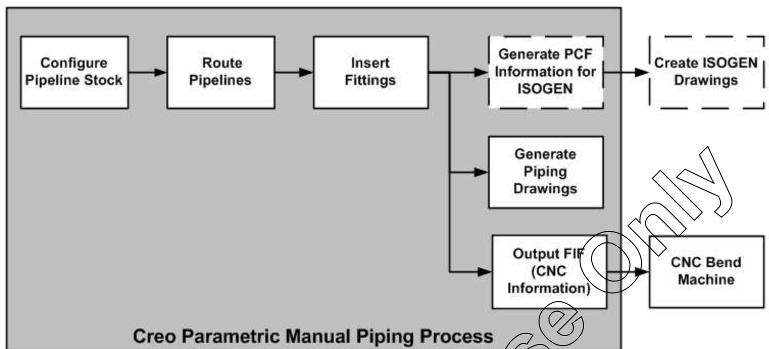


Figure 1 – Manual Piping Development Process

Manual Piping Development Process

The manual piping process (often referred to as non-specification-driven piping) can be divided into a number of tasks:

- Configuring Pipeline Stock – A line stock is a set of parameters that describe material, grade, outside diameter, and other parameters of pipeline segments.
  - These parameters are stored in the line stock feature.
  - Before you create any pipelines, you must configure a line stock.
- Route Pipelines – A physical pipeline consists of pipes and fittings.
  - Before routing a new line, you must create a pipeline feature by assigning its name, line stock, and pipeline parameters. Parameters that are set in a line stock determine routing commands.
  - While routing, you can assign another line stock for segments that start after a fitting or from a new start point.
  - You can also change line shape and corner type for subsequent segments.
  - During or after routing is completed, you can insert fittings or modify pipeline properties according to design needs.
- Insert Fittings – Fittings are parts or assemblies added to piping systems to perform specific functions, for example, reducers and valves.
  - Fittings are typically stored in libraries, enabling them to be easily retrieved and inserted into pipelines when required.
- Output Data – When the piping design is complete, it is possible to generate information for a number of downstream processes, including the following:
  - Generate PCF information for ISOGEN. It is technically possible to create readable ISOGEN.pcf files if required. However, with mechanical based flexible piping designs, this is not a common requirement.

- Generate Piping Drawings. You can create Creo Parametric drawings of piping designs which can, for example, contain installation and bill of materials information.
- Output File Interchange Format (FIF). You can output information for CNC bend machines if required.

Specification-Driven Piping Development Process

Specification-driven piping designs involve using piping specifications and semi-automated routing and fitting insertion. This method is often used by the Plant, Shipbuilding, and Aerospace industries.

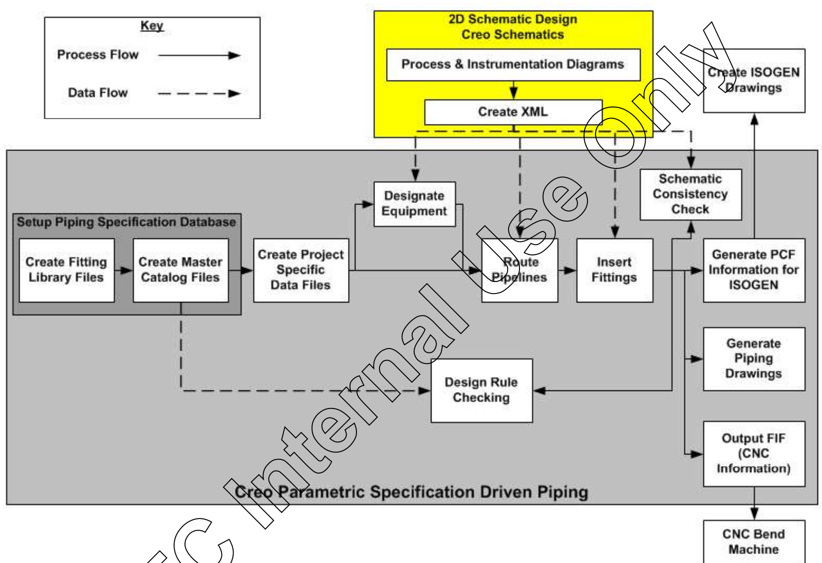


Figure 1 – Specification-Driven Piping Development Process

Specification-Driven Piping Development Process

Specification-driven piping can utilize both 2-D Schematic design information and 3-D piping design information.

The 3-D piping design process can be divided into a number of tasks:

- The Creo Parametric Piping Specification Database contains all of the piping library and catalog files used to create specification-driven piping systems. Setting up the specification database involves:
  - Creating Fitting library files. These are Creo Parametric part files with their associated family tables. Fitting library files provide the physical representation for fittings in a piping model, for example, valves, gaskets, and reducers.
  - Creating Master Catalog (MCAT) files. These files contain all of the basic design information required for pipe modeling. Creo Parametric piping includes MCAT files. You can create MCAT files or modify existing ones when you want to update and expand the piping data.

- Creating Project-Specific Data files involves assigning piping data from the MCAT files for each new project specification. The project-specific data can be stored in the following files:
  - Specification Directory Files: Store all piping specifications, mnemonics, colors, layers, insulation codes, and assigned Auto-Selection files that have been selected for a piping project.
  - Auto-Selection Files: Contain all selected pipes, fittings, bends, miters, and assembly fittings for a piping project.
  - Insulation Directory Files: Contain all selected insulation files, insulation codes, and colors for a piping project.
- Routing Pipelines and Inserting Fittings is a semi-automatic process. Only assigned project-specific piping data is available during these activities.

An additional option is to use 2-D Schematic Design information to further automate pipe routing and inserting fittings.

- Creo Schematic P & IDs can be used to export XML files and transfer the data into 3-D piping designs. This enables designating of equipment, nozzles, and fittings. In addition, when creating pipelines, routing pipes, and inserting fittings, automatic selections (based on the XML data) are made when possible.

When the piping design is complete, it is possible to generate information for a number of downstream processes, including the following:

- Generate the Piping Component File (PCF) information for the Isometric Drawing Generation (ISOGEN). Creo Parametric piping provides an ISOGEN interface that enables you to create isometric drawings of pipelines. The ISOGEN interface exports material and geometrical data from a Creo Parametric Piping model to a readable ISOGEN.pcf format. This format serves as an input to ISOGEN for creating pipeline, spool, and system isometric drawings.
- Generate Piping Drawings. You can create Creo Parametric drawings of piping designs, which can, for example, contain installation and bill of materials information.
- Output File Interchange Format (FIF). You can output information for CNC bend machines.
- Dynamic Design Rule Checking is possible during the pipeline routing process. Various design errors such as bend violations, missing fittings, and end type compatibility problems can be highlighted. These errors can then be corrected before proceeding with the design.
- The Schematic Consistency Check report provides information about the correctness of a 3-D pipe model against the 2-D schematic information stored in an XML file. You can generate reports for all typical pipeline configurations in a piping design.

Understanding Piping Terminology

It is important to understand the terminology associated with piping designs to fully understand the piping development processes.

Understanding Piping Terminology

- Pipelines
  - Pipe Segments
  - Fittings
- Fittings
  - Insert in pipelines
  - Perform functions
  - Examples
    - Reducers/Valves
- Equipment
  - Components with preconfigured ports
  - Route to/from ports
  - Examples
    - Tanks/Pumps
- ISOGEN Drawings
  - Industry Standard Isometric Drawing Format
  - Auto-create from 3-D piping models

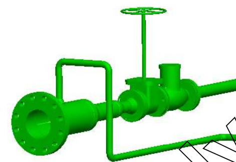


Figure 1 – Pipeline Example

Figure 2 – Fitting Example

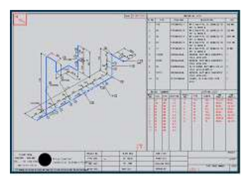


Figure 3 – ISOGEN Drawing Output Example

Understanding Piping Terminology

The following items are key items within both the manual piping development process and the specification-driven piping development process.

- Pipelines are made up of pipe segments and fittings.
  - Pipe Segments can consist of one or more consecutive sections: straight pieces of pipe with bends or miter cuts, or a section of flexible tubing.
  - Creo Parametric creates a break whenever you create a fitting type corner or insert an internal fitting in a pipeline.
- Fittings are parts or assemblies added to piping systems to perform specific functions.
  - Examples of fittings include reducers and different types of valves.
- Equipment is represented by assembly components with predefined entry ports.
  - Pipelines can be routed to or from equipment ports.
  - Examples of equipment include tanks and pumps.

- ISOGEN Drawings – Alias ISOGEN drawings are an industry standard isometric drawing format for the plant piping industry.
  - These drawings can be created automatically from 3-D piping designs in seconds.

Understanding 2-D Schematic Piping Designs

2-D schematic piping designs created in Creo Schematics can be used to transfer piping design information into 3-D specification-driven piping designs.

Process and Instrumentation Diagrams (P & ID)

- Fluid System Map
- Large-Scale Equipment
  - Tanks
  - Heat Exchangers
- Functional Components
  - Valves
- Flow Direction
- Bore Sizes
- Measurement and Control Systems
  - Control and Instrumentation Symbols

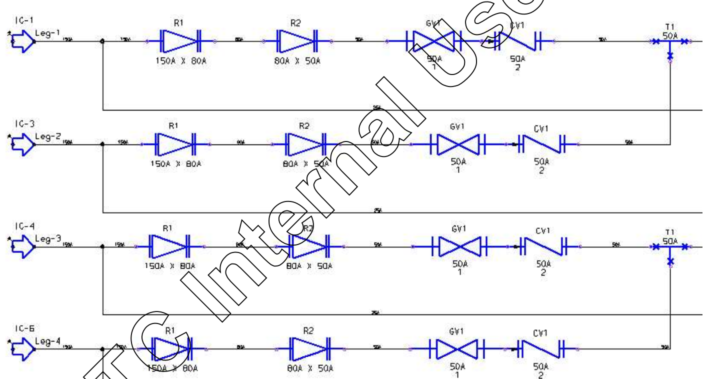


Figure 1 – Schematic Piping Design Example

Understanding 2-D Schematic Piping Designs

Process and Instrumentation Diagrams (P & ID) are used to map fluid systems.

- They contain large-scale equipment, such as tanks and heat exchangers, and major functional components, such as valves and orifice plates. They also contain pipeline details documenting the flow direction, and labelling indicating bore sizes.
- The design intent of any associated measurement and control system can also be captured using control and instrumentation symbols.
- Piping designers may also create a Process Flow Diagram (PFD), in addition to a P & ID.

PROCEDURE - Manual Piping Development Process

Objectives

After successfully completing this exercise, you will be able to:

- Create line stock.
- Manually route pipelines.
- Insert fittings into pipelines.

Close Window **Erase Not Displayed**

Piping\Design_Manual MAN_DESIGN.ASM

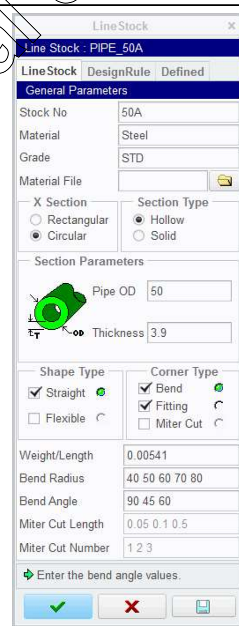
Step 1: Create pipeline stock.

1. Enable only the following Datum Display types:
2. In the ribbon, select the **Applications** tab.
3. Click **Piping** from the Engineering group.

4. Click the Setup group drop-down menu and select **Line Stock**.
5. Click **Create** from the menu manager.
   - Type **PIPE_50A** as the line stock name and press ENTER.
   - Configure the LineStock dialog box as shown.

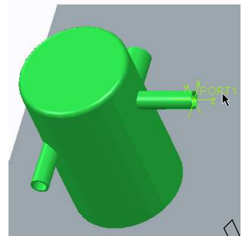
   For shape type and corner type, the check boxes configure selectable options, and the green ball selection configures the default selection.

   - Click **Save** in the LineStock dialog box.
   - Click **OK** and then click **Apply Changes**.
   - Click **Done/Return** from the menu manager.



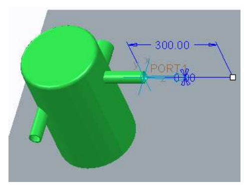
Step 2: Create a pipeline and specify the start point.

1. If necessary, click **Display Thick Pipes** from the View group to disable the display of thick pipelines.
2. In the ribbon, click **Create Pipeline** from the Pipeline group.
   - Type **P50** for the pipeline name and press ENTER.
   - Select **PIPE_50A** from the menu manager.
   - In the ribbon, click **Set Start** from the Routing group.
   - Zoom in and select the PORT1 coordinate system on the multi-tank model, as shown.



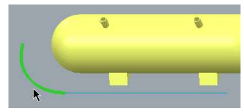
Step 3: Route the pipeline using various routing tools.

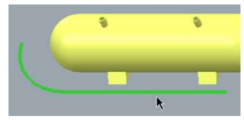
1. Create a pipe segment using the Extend tool.
   - In the ribbon, click **Extend** from the Routing group.
   - Drag the extend drag handle to approximately the location shown.
   - If necessary, edit the extend value to 300 on the model.
   - Click **OK**.



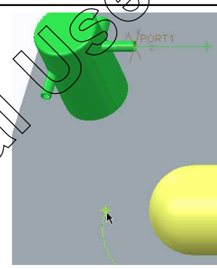
You can create disjointed pipe segments and then join them into a continuous pipeline, as needed.

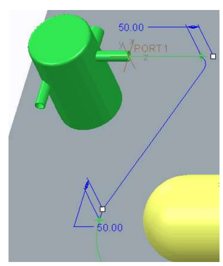
2. Create a disjointed pipe segment using the Follow Curve tool.
   - Select **Follow Curve** from the Follow types drop-down menu in the Routing group.
   - Select one section of the curve in the model, as shown.
   - Press SHIFT and select the other section of the curve, as shown.
   - Notice that the curve highlights, as shown.
   - Click **Proceed With Changes** in the Follow Curve dialog box.

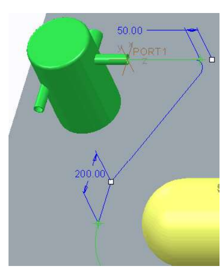




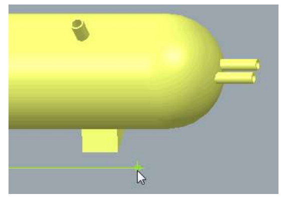
3. Connect pipe segments using the Connect tool.
   - In the ribbon, click **Connect** from the Routing group.
   - Select the end of the first segment, and then press CTRL and select the end of the follow curve segment, as shown.
   - Edit Length 1 to **50**.
   - Edit Length 2 to **200**.
   - Notice that the pipeline updates, as shown.
   - Click **Proceed With Changes** in the Connect dialog box.

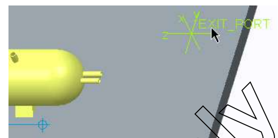


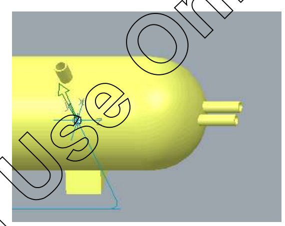


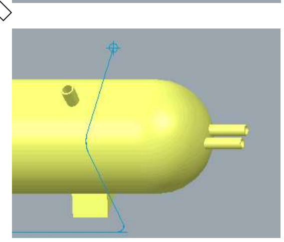


4. Create pipe segments using the Extend tool.
   - In the ribbon, click **Set Start** from the Routing group.
   - Select the end point of the current pipeline, as shown.
   - Click **Extend** from the Routing group.
   - In the Extend dialog box, select **Along Csys Axis** from the drop-down list.
   - Select **Offset from Ref** for the Dimension options.
   - For the Plane/Csys reference, select the EXIT_PORT coordinate system on the man_design model, as shown.
   - Select the **Y axis** radio button.
   - Click **Apply**.
   - Notice that a pipe segment is created.
   - Select the **X axis** radio button.
   - Click **OK**.
   - Notice that another pipe segment is created, as shown.

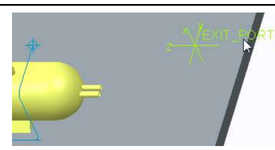


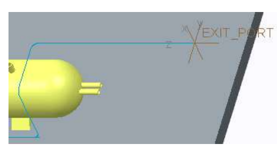




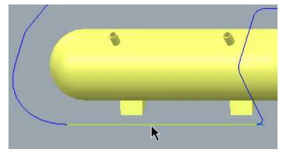


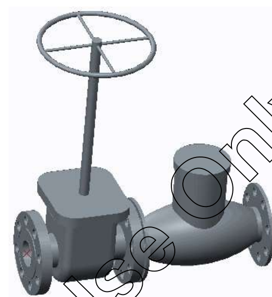
5. Create a pipe segment using the To Pnt/Port tool.
   - In the ribbon, click **To Pnt/Port** from the Routing group.
   - Select the EXIT_PORT coordinate system on the model, as shown.
   - Click **Apply Changes** in the To Point/Port dialog box.
   - Notice that another pipe segment is created, as shown.

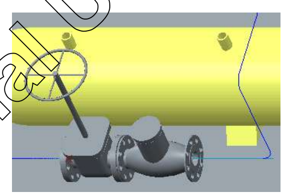




Step 4: Insert a valve fitting in a pipeline.



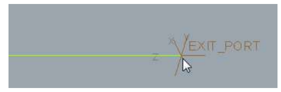


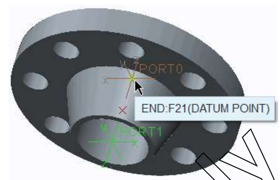


1. Disable **Csys Display**.
2. Enable **Point Display**.
3. In the ribbon, click **Insert Fitting** from the Fitting group.
   - Click **Straight Brk** from the menu manager.
   - Select GATE_CHECK_VALVE.ASM and click **Open**.
   - Select the approximate location along the pipe segment, as shown.
   - Click **Length Ratio** from the menu manager.
   - Type **0.25** for the value, and press ENTER.
   - Notice that the fitting assembly appears in a sub-window, as shown.
   - Prehighlight point END on the fitting assembly model and then select it.
   - Notice that a fitting is inserted as shown. You can flip or twist the fitting at this point if required.
   - Click **Done** from the menu manager.

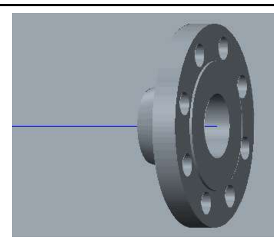
Step 5: Insert an end type flange fitting at the pipeline end port.

1. Enable **Csys Display**.
2. In the ribbon, click **Insert Fitting** from the Fitting group.
   - Click **End** from the menu manager.
   - Select FLANGE_NECK_RF.PRT and click **Open**.
   - Select the correct size to match the current pipeline line stock.
   - In the Select Instance dialog box, select instance FLANGE_NECK_RF-STEEL-30K-50.PRT and click **Open**.
   - Zoom in and select the pipe end next to the exit port, as shown.
   - Notice that the flange instance is now displayed in a separate window.
   - Select PORT1 as the entry port on the flange model, as shown.
   - Prehighlight END point on the model and then select it, as shown.
   - Notice that the selected point aligns the fitting centerline with the pipe centerline.
   - Click **Done** from the menu manager.

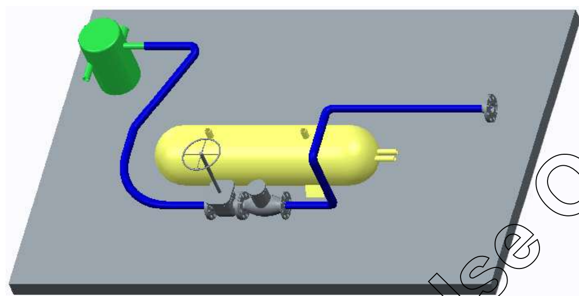




3. Disable **Point Display**.
4. Disable **Csys Display**.
   - Notice that the fitting is inserted at the end of the pipe segment, as shown.



5. Review the completed pipeline.
   - Press CTRL+D to return to the standard orientation.
   - In the ribbon, click **Display Thick Pipes** from the View group to enable the display of thick pipelines.
   - Observe the completed pipeline, as shown. Notice that the pipeline includes pipe segments and inserted fittings.



6. Save the piping assembly.
   - Click **Save** from the Quick Access toolbar.
   - Click **OK** to save the assembly.
   - Click **Close** from the Quick Access toolbar.
   - Click **Erase Not Displayed** from the Data group.
   - Click **OK** to erase all non-displayed objects from memory.

This completes the procedure.

PROCEDURE - Specification-Driven Piping Process

Objectives

After successfully completing this exercise, you will be able to:

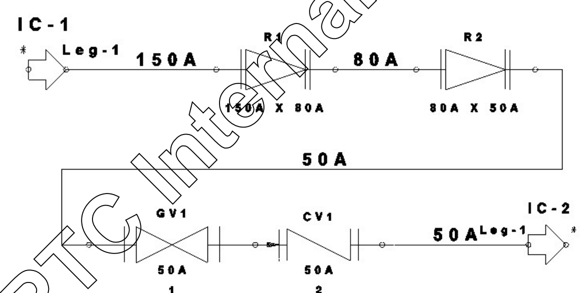
- Route specification-driven pipelines using schematic information from Creo Schematics.
- Insert fittings in specification-driven pipelines using schematic information from Creo Schematics.

Close Window **Erase Not Displayed**

Piping\Design_Spec SPEC_DESIGN.ASM

Step 1: Review schematic information.

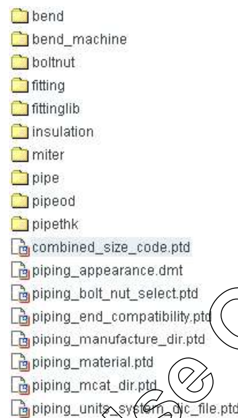
1. Enable only the following Datum Display types:
2. Review the completed schematic piping design from Creo Schematics.
   - Observe the schematic piping design shown. It contains pipeline size and fitting information.



The schematic information in this piping design has already been exported to an XML file for use in a specification-driven pipeline in Creo Parametric.

Step 2: Review master catalog (MCAT) information in the piping specification database.

1. Review the MCAT file and folder structure.
   - Click **Folder Browser** from the navigator.
   - In the folder tree, browse to the **Piping\Design_Spec\master_catalog** folder to view its contents in the browser.
   - Observe the different files and folders contained within the MCAT folder; these make up the specification database.



2. Review the contents of the PIPING_MCAT_DIR.PTD file, as shown.

"CATEGORY"	"SNAME"	"MCAT_FILE"	"PIPE_OD_FILE"	"PIPE_THK_FILE"	"SIZE_CODE _FILE"	"BOLT_NUT _CODE"
"PIPE"		"pipe/pipe_steel"	"pipeod/od_steel"	"pipethk/thk_steel"		
"ELBOW"	"ELBOW90"	"fitting/ elbow_90_bw_steel"	"pipeod/od_steel"			
"BRANCH"	"TEE_STRAIGHT"	"fitting/ tee_straight_bw_steel"	"pipeod/od_steel"			
"BRANCH"	"TEE_REDUCING"	"fitting/ tee_reducing_bw_steel"	"pipeod/od_steel"			
"FLANGE"	"NECKFLANGE"	"fitting/flange_neck_rf"	"pipeod/od_steel"			
"GASKET"	"GASKET"	"fitting/gasket_neck"	"pipeod/od_steel"			
"REDUCER"	"CRED"	"fitting/ red_concentric_bw_steel"	"pipeod/od_steel"			
"REDUCER"	"CRED"	"fitting/npt_adapter"	"pipeod/od_steel"			
"VALVE"	"GATE"	"fitting/vl_gate_flrf"	"pipeod/od_steel"			"CFE"
"VALVE"	"CHECK"	"fitting/ vl_swing_check_flrf"	"pipeod/od_steel"			"CFH"
"BRANCH_LET"	"WELDOLET"	"fitting/weldolet"	"pipeod/od_steel"			

This file lists the available pipe and fitting MCAT files and insulation files. Each file entry associates a piping category and an MCAT file with a pipe outer diameter file, a pipe thickness file, a combined size code file, a selection name for a fitting category, and the bolt nut code associated with the fitting.

3. Review the contents of the fitting MCAT folder.
   - In the folder tree, browse to the **Piping\Design_Spec\master_catalog\fitting** folder to view its contents in the browser.
   - Observe the different files contained within the fitting folder; these make up the available fittings within the specification database.

4. Review the contents of the ELBOW_90_BW_STEEL.PTD fitting file, as shown.

SCH_RATE	SIZE	NSIZE	BSIZE	END_TYPE	NEND_TYPE	FITT_MODEL_NAME	WEIGHT
40	25A			BW		ELBOW_90_BW-STEEL-S-25<ELBOW_90_STEEL_BW>	
40	50A			BW		ELBOW_90_BW-STEEL-S-50<ELBOW_90_STEEL_BW>	
40	65A			BW		ELBOW_90_BW-STEEL-S-65<ELBOW_90_STEEL_BW>	
40	80A			BW		ELBOW_90_BW-STEEL-S-80<ELBOW_90_STEEL_BW>	
40	100A			BW		ELBOW_90_BW-STEEL-S-100<ELBOW_90_STEEL_BW>	
40	125A			BW		ELBOW_90_BW-STEEL-S-125<ELBOW_90_STEEL_BW>	
40	150A			BW		ELBOW_90_BW-STEEL-S-150<ELBOW_90_STEEL_BW>	

This file specifies the elbow fitting name based on rating, size, and end type. Any blank columns indicate the field is not applicable for this type of fitting.

5. Click **Model Tree** from the navigator to return to the model tree.
   - Minimize the browser pane.

Step 3: Prepare to route a specification-driven pipeline using schematic information.

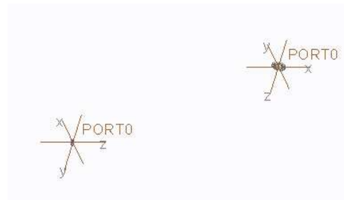
1. Click **Settings** in the model tree and select **Tree Filters**.
2. Select the **Features** check box and click **OK** in the Model Tree Items dialog box.
3. Load piping-specific configuration options.
   - Click **File > Options**.
   - Click **Configuration Editor** in the Creo Parametric Options dialog box.
   - Select **Import configuration file** from the Import/Export drop-down menu.
   - Click **Working Directory** .
   - Select PIPING_CONFIG.PRO and click **Open**.
   - Click **OK** in the Creo Parametric Options dialog box.
   - Click **No** in the Creo Parametric Options message window.

> This ensures that the configuration option piping_design_method is set to spec_driven and piping_schematic_driven is set to yes. This enables schematic information from Creo Schematics piping designs to be used during specification-driven pipeline routing.

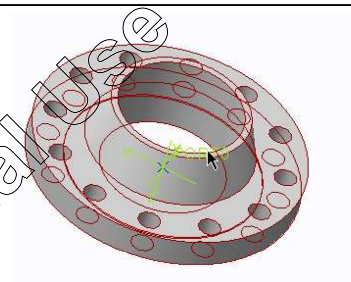
4. In the ribbon, select the **Applications** tab.
5. Click **Piping** from the Engineering group.
6. Click **Piping System Views** in the model tree.
   - If necessary, click **Pipeline View** to de-select the option in the drop-down list.
7. Expand WATER-LEG-1.ASM in the model tree.
   - Notice the created line stock (TRAINING_SPEC_150A_40) and pipeline (LEG-1), as shown.
   - This information was generated using the schematic design in Creo Schematics.

Step 4: Route a specification-driven pipeline using schematic information.

1. In the ribbon, click **Pipe** from the Routing group.
   - Select LEG-1 in the model tree.
   - Click **Confirm** to activate the WATER-LEG-1.ASM.
   - Notice that the available routing ports and components are highlighted on the model, as shown. These components represent the entry and exit ports for the pipeline.

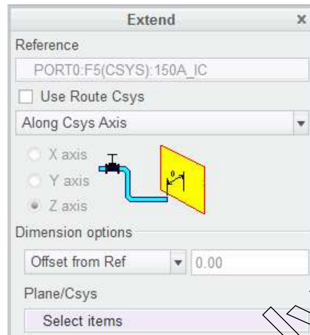


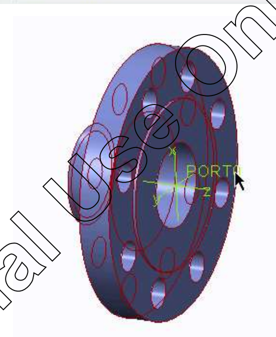
2. Specify the pipeline start point.
   - In the ribbon, click **Set Start** from the Routing group.
   - Zoom in and select PORT0 on the 150A_IC component in the model, as shown.
   - Click **OK**.

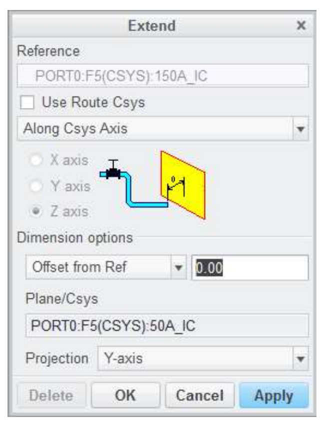


3. Create the first pipeline segment.

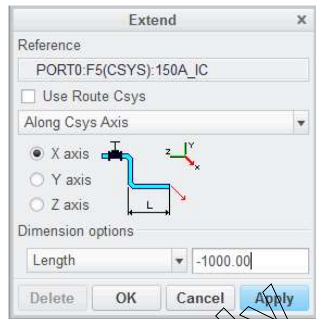
- In the ribbon, click **Extend** from the Routing group.
- Select **Along Csys Axis** as the type of extend.
- Select **Offset from Ref** as the dimension option, as shown.
- Select PORT0 on the 50A_IC component in the model, as shown.
- Edit the offset value to **0.00** and press ENTER. Notice that the Extend dialog box updates, as shown.
- Click **Apply**.

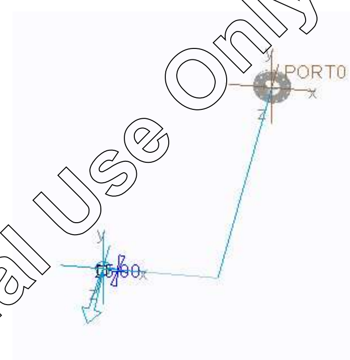




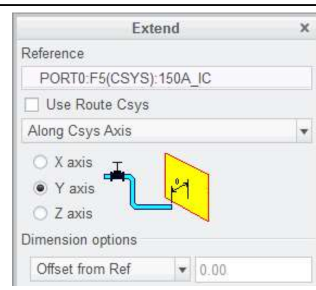


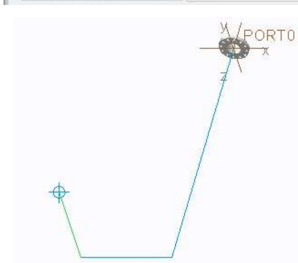
4. Create a second pipeline segment by extending a specified distance in a direction along a coordinate system axis.
   - Select the **Length** Dimension option.
   - Select the **X axis** radio button.
   - Edit the length value to **–1000** and press ENTER, as shown.
   - Click **Apply**.
   - Notice that another pipe segment is created, as shown.



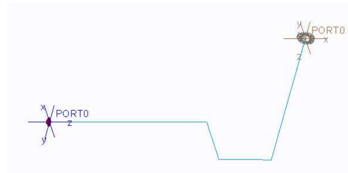


5. Create a third pipeline segment by extending a specified distance in a different direction.
   - Select the **Y axis** radio button.
   - Select **Offset from Ref** as the dimension option, as shown.
   - Select PORT0 on the 50A_IC component in the model.
   - Click **OK**.
   - Notice that another pipe segment is created, as shown.





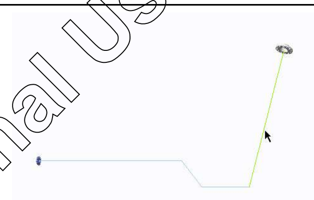
6. Create a fourth pipeline segment.
   - In the ribbon, click **To Pnt/Port** from the Routing group.
   - Select PORT0 on the 50A_IC component in the model.
   - Click **Create Pipe Segment** in the To Point/Port dialog box.
   - Notice the completed pipeline routing, as shown.



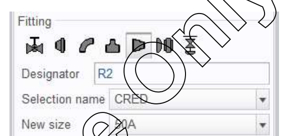
The warning in the message area indicates that the pipe segment size 150A and the entry port size 50A are mismatched. This can be resolved by inserting a reducer in the pipeline.

Step 5: Insert reducer fittings in the pipeline using schematic information.

1. Disable **Csys Display**.
2. In the ribbon, click **Insert Fitting** from the Fitting group.
   - Select a location on the pipeline segment, as shown.
   - Notice that the Insert Fitting dialog box is complete, as shown. A reducer fitting of size 80A is automatically selected based on the associated XML file.
   - Edit the fitting position to **800** on the model.
   - Click **Apply**.
   - Notice that the reducer fitting is placed on the pipeline, as shown.

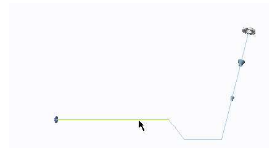


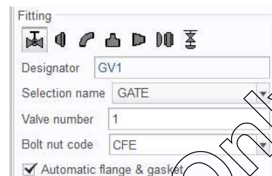
3. Insert a second reducer fitting.
    - Select a location on the pipeline segment, as shown.
    - Notice that the Insert Fitting dialog box is complete, as shown. A reducer fitting of size 50A is automatically selected based on the associated XML file.
    - Edit the fitting position to **1000** on the model.
    - Click **Apply**.
    - Notice that the second reducer fitting is placed on the pipeline, as shown.

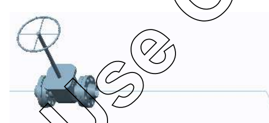


Step 6: Insert valve fittings in the pipeline using schematic information.

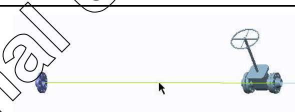
1. Insert a gate valve fitting.
   - Select a location on the pipeline segment, as shown.
   - Notice that the Insert Fitting dialog box is complete, as shown. A gate valve fitting is automatically selected based on the associated XML file.
   - Edit the fitting position to **1000** on the model.
   - Click **Apply**.
   - Notice that the valve fitting is placed on the pipeline, as shown.

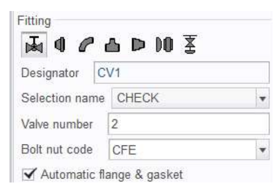






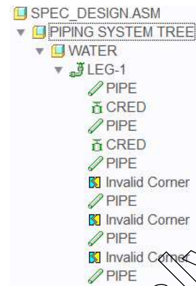
2. Insert a check valve fitting.
   - Select a location on the pipeline segment, as shown.
   - Notice that the Insert Fitting dialog box is complete, as shown. A check valve fitting is automatically selected based on the associated XML file.
   - Edit the fitting position to **1000** on the model.
   - Click **OK**.
   - Notice that the valve fitting is placed on the pipeline, as shown.





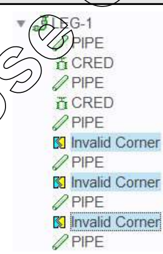
Step 7: Add corner fittings to the pipeline.

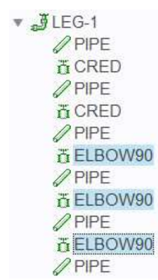
1. Click **Piping System Views** in the model tree.
   - If necessary, click **Pipeline View** to activate the option in the drop-down list.
   - Expand the WATER and LEG-1 items in the model tree.

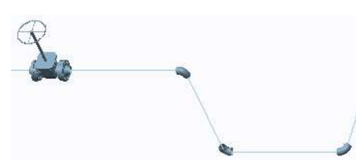


Notice the invalid corners in the model tree. You can correct this by inserting corner fittings.

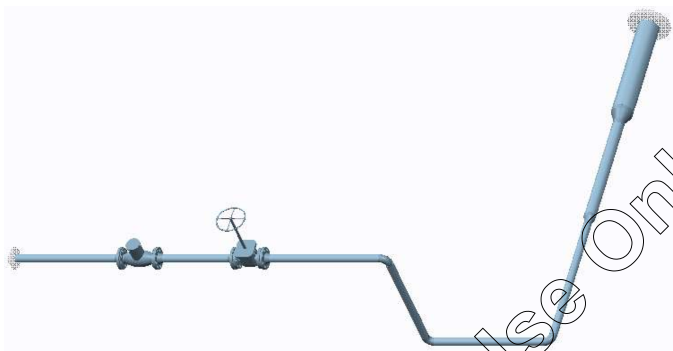
2. Press CTRL and select the three **Invalid Corner** fittings in the model tree, as shown.
   - Right-click and select **Insert > Elbow**.
   - Notice that the model tree updates and elbow fittings are inserted in the pipeline, as shown.







3. Display thick pipe segments.
   - In the ribbon, click **Display Thick Pipes** from the View group.
   - Notice that the pipe segments are displayed as thick pipes, as shown.



You can toggle the display of thick pipe segments as required.

4. Save the piping assembly.
   - Click **Save** from the Quick Access toolbar.
   - Click **OK** to save the piping assembly.
   - Click **Close**.
   - Click **Erase Not Displayed**.
   - Click **OK** to erase all non-displayed objects from memory.

This completes the procedure.

